

Applicant : Stefan Hein  
For : LOCK VALVE IN PARTICULAR FOR A  
STRIP PROCESSING UNIT  
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In the Specification:

Please insert the following heading before paragraph [0001].

--FIELD OF THE INVENTION--.

Please replace paragraph [0001] with the following amended paragraph.

The present invention refers to an air-lock valve, especially for a band treating or coating plant, ~~with the features of preamble of claim 1.~~

Please insert the following heading before paragraph [0002].

--BACKGROUND OF THE INVENTION--.

Please replace paragraph [0002] with the following amended paragraph.

Processing plants of this type are mainly designed for coating flexible band substrates, such as, for example, plastics foils, magnetic tapes, films, etc. in vacuum (for example, by sputtering, ~~i.e.~~ i.e., target atomization, eventually reinforced by magnetic fields, evaporation, PVD or CVD processes), as well as for additional processing methods, such as pre-processing / cleaning / drying / surface activation / polymerization, etc. It is required, in such cases, to introduce into the plant the band substrates, supplied in the form of bales or foils, which are being placed upon a bearing axle, so that during the coating process, the band substrate may be unrolled from this bale.

Please replace paragraph [0006] with the following amended paragraph.

It should be aimed not to ventilate the coating chamber, operating in vacuum, at each exchange of the substrate bale, ~~i.e.~~ i.e., when removing from a band substrate a newly rolled up bale, which has just been coated.

Please replace paragraph [0007] with the following amended paragraph.

It is, therefore, already known to mount air-lock valves between individual modules.  
The volume which is ~~again to be ventilated,~~ ventilated is thus clearly reduced, since only the

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intake and removal stations, respectively, are being ventilated and the effective coating chamber may permanently remain in an evacuated condition. Evidently, in case of need, the entire plant may be ventilated.

Please replace paragraph [0009] with the following amended paragraph.

Although during normal ~~operations~~, operations the band substrate does not establish contact neither with the tube nor membrane seal, or with said sealing surface, the available passage slot must remain quite narrow, in view of the narrowly limited stroke of the tube or membrane seal. During eventual oscillations of the band substrate during the coating process, contacts may thus occur between said substrate and the border areas of the passage, which, during the evacuation phase from the coating chamber, could result in damages of the coating, which has just been applied. Additionally, due to such undesired contacts, even a rupture of the band substrate under quite high tensile stress may be caused, which again would imply in a forcible ~~paralysation~~ paralyzation of the plant.

Please replace paragraph [0012] with the following amended paragraph.

Document DE 199 12 707 A1 describes a processing plant for a plane, for example, band-like substrates. Two revolving bands pass through its (evacuatable) housing, contacting each other in the areas of the passages to introduce and remove the substrate, or including the plane substrate, which they transport between themselves. A sufficient sealing effect is being obtained here due to the spatial contact of both bands with the substrate, but resulting in an extremely reduced width of the passage gap and in a constant superficial contact of said substrate with the conveyor belts.

Please replace paragraph [0013] with the following amended paragraph.

Document DE 199 60 751 A1 describes another air-lock of this type, which essentially comprises two cylinders with flexible, tube-like casings, which contact each other and between which a band substrate may pass. To improve the sealing effect and in order to minimize lateral gaps between said cylinders and the borders of the passing substrate, the cylinder

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casings may be pressurized at least temporarily. During this procedure, they inflate and increase, on one side, the contact pressure upon the substrate, and, on the other side, they largely close said lateral gaps. In the area of the vacuum chamber, the cylinder casing surfaces are being supported with supporting rolls towards the inside of the vacuum chamber, to avoid excessive expansion, which implies in quite a considerable additional effort.

Please replace paragraph [0015] with the following amended paragraph.

Also document WO 99/50 472 describes a vacuum band coating plant, in which the band substrate must pass through cylinder air-locks between loading and discharge stations and the effective reaction chamber, said cylinder air locks acting as pressure stages. In one version, it may pass between two cylinders rolling upon each other, and, in another version, it may pass between a cylinder and a fixed sealing block. These cylinder air-locks may be opened, in order to introduce, for example, a new band substrate. For this purpose, either one of the cylinders may be folded out, its rotary axis being mounted foldable around an axis of rotation, or the sealing ~~block~~ block will be removed from the cylinder. In a variant with only one cylinder, the band is being transported between the cylinder and sealing block through quite a narrow gap, however open at its end, in order not to be submitted to excessive mechanical stress. A complete sealing cannot be obtained in this variant.

Please insert the following heading before paragraph [0016].

--SUMMARY OF THE INVENTION--

Please delete paragraphs [0017] and [0018].

Please replace paragraph [0019] with the following amended paragraph.

To improve the air-lock valve, a frame-like sealing face is ~~being~~ formed, which surrounds the opening through which the band substrate passes. A body corresponds with the sealing surface, which is disposed on one side of the band substrate, being moveably mounted with a mechanically operated stroke. Said body is adjusted in such a fashion on the sealing

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surface, that it can wholly overlap the opening surface it encompasses and, simultaneously, may close it completely. This latter procedure should be considered independently of whether a band substrate is passing or not through the opening.

Please replace paragraph [0020] with the following amended paragraph.

In the first case, the segment of the band substrate is simply mounted between the body and the sealing surface, when it will be flexibly deformed and will also not be damaged, when the sealing surface and the body are adequately designed. During this process, the body evidently establishes only an indirect contact with the sealing surface, since the band substrate is ~~being~~ positioned in a fashion similar to an additional sealing means.

Please replace paragraph [0021] with the following amended paragraph.

This disposition and function of the air-lock valve offers the advantage that at each change of the band, ~~i.e.~~ i.e., normally after the complete passage of a band spool through the coating plant, one segment of the band may remain inside the coating chamber, ~~i.e.~~ i.e., inside the module, consisting eventually of different subsequently placed coating chambers. After introduction of a new spool into the unrolling chamber, the new band substrate may be firmly glued with said segment, whilst on the rolling up side, the remaining section is being applied upon an empty spool. After evacuating both loading or exchange chambers, the initial section of the new band substrate may be introduced into the coating plant by means of the remaining segment.

Please replace paragraph [0025] with the following amended paragraph.

With this ~~configuration~~ configuration, one avoids especially too strong bending angles of the band substrate in the closed position of the air-lock valve. With a plane sealing surface, this will at least be placed in an inclined position upon the band substrate vis-à-vis the vertical line, so that the band section fixed by the sealing body will be bent only in an obtuse angle during the closing phase of the air-lock valve. With arcuate sealing face contour, its global

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curvature will be correspondingly applied, as will be described later in more detail, based on the exemplary embodiment.

Please replace paragraph [0026] with the following amended paragraph.

It is understood, ~~anyhow~~, that the edges of the sealing surface, on one side, should consist of flexible material (for example, rubber, soft plastics, etc.), in order to improve the sealing effect by means of superficial adhering, and, on the other side, they should also be quite well rounded, in order to practically exclude damages (buckling, folds, fissures) at the band substrate. Specifically, also the body is preferably provided with an elastically flexible surface material, such as the sealing surface, or is wholly manufactured from such material.

Please replace paragraph [0030] with the following amended paragraph.

~~As drives for transposition or reversal of the body, reversible~~ Reversible electrical or fluidic drives may be considered for transposition or reversal of the body, eventually with interposition of an adequate power transmission or linkage. Since under normal operating conditions of the plant, the air-lock valve does not have to be constantly reversed bidirectionally, a manual drive could also be provided and the body could eventually be mounted on the sealing surface by means of an accumulator (for example, a mechanical or gas-pressure spring) or a toggle joint or similar device. A manual drive will ~~anyhow~~ be provided, for example in the event of a failure of foreign power drives.

Please insert the following heading before paragraph [0034].

--BRIEF DESCRIPTION OF THE DRAWINGS--

Please insert the following heading before paragraph [0038].

--DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT--.

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Please replace paragraph [0042] with the following amended paragraph.

Additionally, by means of a swivel arm 8, a cylinder-shaped valve or sealing body 7 is rotably mounted around an axis 9 inside housing 2. The angle of traverse designated  $\alpha$ , may be recognized between the inactive position (drawn section) and a closed position of said sealing body 7 at both phantom (dash-dotted line) representations of swivel arm 8. The cylindrical format of the sealing body offers the advantage that not always the same surface section of its cylindrical surface establishes contact with the sealing surface. Basically, the cylindrical sealing body may be rotably mounted on said swivel arm 8, similar to a roll cylinder. Also, the roll consists of metal and its surface features a rubber coating.

Please replace paragraph [0043] with the following amended paragraph.

Basically, also plastics may be used for the sealing seat and roll, as long as they are suitable for vacuum and especially do not have excessive outgasing features.

Please replace paragraph [0044] with the following amended paragraph.

~~Roller-~~ Sealing body 7 is longer than the width of opening 3, so that it also overlaps the short edges of said opening, being able to provide a direct sealing capacity.

Please replace paragraph [0049] with the following amended paragraph.

It should be recalled that on the right side of the sealing body 7, i.e. of housing 2, atmospheric pressure may prevail, while in normal operation of the plant, on the left side ~~always-vacuum~~ always will prevail. As can be ~~seen-~~ seen by means of the pressure differential from right to left, the contact pressure of sealing body 7 upon sealing surface 5, ~~i.e.-~~ i.e., band substrate 4, is still being increased, so that an overall quite intense and trustworthy sealing effect will be attained.